ATTACHMENT A

Remarks

By this Amendment, various clarifying corrections have been made in the specification in a manner similar to clarifying revisions to the claims. It is submitted that the present application is in condition for allowance for the following reasons.

Initially, it will be appreciated that numerous clarifying changes have been made to the specification to better conform the specification to US terminology and practice, with the result that a substitute specification has been filed. The substitute specification has been filed in two versions, a marked up copy showing all of the changes, and a clean copy with the changes effected. It is submitted that these changes do not include any new matter, as is evident from the marked up copy.

In the *Claim Rejections - 35 USC § 112* section of the outstanding Office Action, claims 1-3 were all rejected as being indefinite for a variety of reasons. Therefore, by this Amendment, claims 1-3 have been substantially rewritten to overcome the noted problems and to place the claims in better conformance with US practice and terminology (and hence as well for consistency with the revised specification). These revisions include the removing of an alternative subject matter from claim 1, which is now found in new claim 4. In view of these changes, it is submitted that claims 1-4 are now definite.

In the *Claim Rejections - 35 USC § 102* section, independent claims 1 and 3 as well as dependent claim 2 were rejected under 35 USC § 102 as being anticipated by Mavretic. However, for the following reasons, it is submitted that amended claims 1-4 are all allowable over this reference.

Initially, it will be appreciated that some of the benefits of the present invention are as follows.

1. During transmission of the actual transmitted load signal U_{LOAD} between phase rail (1) and zero rail (n), the rail signal (e.g., in a switchboard cabinet) may be 5–10 times greater than in previous situations. In many cases, this will produce good results by itself. Thus, this invention: eliminates temporary losses of carrier wave signal, has a better signal/noise, has a lower bit error rate (BER), has a greater speed of data transmission, has a better reliability of data transmission, has a longer operation distance, and allows new PLC-products to be developed.
2. It is not necessary for the apparatus to be coupled to a wall outlet (plug-in-apparatus) or near a wall outlet, because the connecting cable may be longer when using this invention. However, during transmission, the load signal voltage U_{LOAD} remains very great, e.g., between the phase rail and the zero rail (rail signal), in the switchboard cabinet.

In view of the above, it will be appreciated that there are a number of differences between the present invention and Mavretic as follows.

<u>1. Transmission lines.</u>

a) The transmission line in Mavretic between RF-generator 150 or 210 and load 160 or 230 is a coaxial cable or other signal cable, which is screened against electromagnetic disturbances. The wave impedance of the coaxial cable is in general about 50 ohm. No electric net voltage (e.g. 230 V 50 Hz) exists in this transmission line. Thus, no electric equipment (230 V 50 Hz) has been connected to this line. In addition, the signal frequency may be 13,56 MHz and its harmonics.

b) The claimed transmission line in the present invention is, for example, a low voltage net (230 V 50 Hz) line in apartment buildings. Thus, it does not use coaxial cables but only the electric network line, into which electric network line many kinds of electric apparatus are connected via wall outlets or the like. There are thus very bad electromagnetic disturbances in the electric network line of the type claimed, and no impedance matching is possible. Signal frequency in such electric network line may be, e.g., 3 –148,5 kHz.

CONCLUSION 1: In view of the above, quite different transmission lines are used in the present invention and in the teachings of Mavretic, and this difference is claimed.

2. Loads and the load impedances.

a) The invention of Mavretic may be used in many different kinds of applications of RF powered systems, e.g., in plasma processing applications, medical applications, food tempering and thawing, ceramic heating systems comprising a laser, transmission antennas, etc. Good impedance matching requires that the output impedance of RF generator 210 is the same as the wave impedance of transmission line140 and the same as the load impedance 230, e.g., 50 ohm, see Fig. 2. Load impedance may vary slightly, e.g., with 13.56 MHz and its harmonics in the plasma chamber. Signals in transmission line 140 are monitored continuously by signal sensing circuit 110; and impedance matching network 220 between RF generator 210 and load 230 are controlled so that impedance matching becomes better, see Fig. 2.

b) The load impedance Z_{LOAD} in the present invention may vary very widely, e.g., 0.5 - 30 ohm; and there is in general no impedance matching and only load signal voltage

U_{LOAD} is kept constant and great as claimed, i.e., independent of load impedance variations, not power.

CONCLUSION 2: There are great differences between the claimed loads. Further, in Mavretic's invention, the exact impedance matching at the fundamental frequency and its harmonics is important; whereas in the present invention, the maximum load signal voltage is important and is what is claimed, not impedance matching or signal power in the load.

3. Functional differences.

a) The title of Mavretic tells the functional principle of the invention: namely, it is a "method and apparatus for monitoring parameters of an RF powered load in the presence of harmonics". As taught therein, an RF generator transmits an RF signal (the fundamental frequency and its harmonics) to the load via transmission line 140, see Fig. 3. Voltage sensing unit 302 and current sensing unit 304 are monitoring signal voltages and currents or the fundamental frequency and its harmonics preceding to the load and reflecting from the load. Finally, the following parameters are measured or calculated: signal currents, signal voltages, phases, load impedance, power dissipation, discharge currents, etc., with the fundamental frequency and its harmonics. Using these parameters, the impedance matching can be controlled better and the RF generator can be controlled so that maximum power is achieved to the load. Also other remedies are effected. Further, signals of the fundamental frequency and its harmonics on transmission line 140 can be monitored via wave shaping units 308 and 310, and further via switch 312 and active band pass filter/amplifier 314. The signals can be monitored and the system controlled

also by an external computer system (e.g. display, keyboard, mouse, etc.) connected to the digital signal processing (DSP) unit 328.

b) In the present invention, the harmonics are filtered off because they are only harmful distortion signals which are not monitored like in Mavretic. In the present invention as claimed only the signal voltage of fundamental frequency is transmitted further to the electric net (e.g. 230 V 50 Hz).

<u>CONCLUSION 3:</u> Different principles in functions are apparent between the present invention and Mavretic, as evident by the claims.

In view of the above, it is submitted that the subject matters of independent claims 1 and 3 are neither disclosed nor made obvious by Mavretic. Thus, claims 1 and 3 are now allowable. In addition, it is submitted that dependent claims 2 and 4 are also allowable at least for the same reasons as independent claim 1 from which they both depend.

For all of the foregoing reasons, it is submitted that the present application is in condition for allowance and such action is solicited.

ATTACHMENT B

Amendments to the Specification

Substitute Specification - Marked Up Copy

Please replace the specification with the amended specification provided hereafter.

METHOD IN AN ELECTRIC NET DATA TRANSMISSION SYSTEM FOR KEEPING THE SIGNAL LEVEL CONSTANT IN A COUPLING FURNISHED WITH CONNECTING CABLE

The common problem ~~by~~ with data transmission in a low voltage net, for example 12 VAC/DC, 24 VAC/DC, 48VAC/DC, 115 VAC, 230 VAC and 400VAC, is the weakening of the transmission signal ~~in~~ due to the ~~supply~~ connecting cable and due to the load impedance~~i.e. in the network connection cable~~, for instance only a fraction of signals sent by the transmitter gets ~~to~~ between the ~~network~~ phase rail and the zero rail. The problem is most severe when the connecting ~~supply~~ cable is long and when the load ~~rail~~ impedance at used signal frequencies is very low. Among other things, this problem can prevent commercial profiting of net data transmission systems.

The invention removes the problem ~~in~~ by eliminating the impact of the weakening on coupling capacitor C_C and of the connecting ~~supply~~ cable ~~L_W, $\underline{Z}_W$~~ with the small values of load impedance. Thus the standard-allowed maximum signal SFS-EN-50065-1:122 dBuV is produced ~~in~~ between the phase rail and the ~~network~~ zero rail and in this respect data transmission in a low voltage net is made reliable even with low net impedance $\underline{Z}_{LOAD}$.

Even in the most advanced solutions of the present technique, where the output signal of the apparatus is constant, in other words independent of the net impedance, the coupling capacitor C_C and connecting ~~supply~~ cable cause weakening of the transmission signal. The situation is especially bad~~,~~ when the net impedance is very low.

Figure 1 shows the weakening of the transmission signal by a 3 meter connecting ~~supply~~ cable. Thereby the weakening is about 7 dB;~~,~~ but if the length of the connecting ~~supply~~ cable ~~being~~ is for instance 10 m, the weakening is ~~even~~ about14 dB (1/5 voltage) when the load impedance ~~of net impedance~~ Z_{LOAD} is 1 ohm.

The block diagram of the whole invention is presented in figure 2. ~~Block~~ The voltage source 10 is the source of supply ~~operating~~ voltage furnished with constant or adjustable output voltage U_S. U_S is the supply ~~operating~~ voltage of signal amplifier 20.

Input signal $\underline{U}_{IN}$ (e.g., under 95 kHz, 95-125 kHz, 125-140 kHz or 140-148,5 kHz) can be a sinus or a square signal to its amplitude, e.g. 5 V_{PP}. The input signal is taken by adjustable amplification or, after signal amplifier 20, furnished with level regulation $\underline{U}_{OUT}$ to low pass or

band pass signal filter 40, where harmonic distortion (crack) signals are filtered out from the basic frequency signal. Filtered signal $\underline{U}_{FL}$ is then taken to coupling unit 50 ~~in the network~~ and further to the low voltage net, ~~L-N~~ e.g., with a 3 meter connecting ~~supply~~ cable.

The network impedance between the phase rail and zero rail, the rail impedance, is described by signal frequencies with load impedance $\underline{Z}_{LOAD}$. The series impedance of the connecting cable is described with impedance $\underline{Z}_W$. The connecting ~~supply~~ cable length is L_W.

Dotted broken line A illustrates the traditional idea of the transmitting apparatus, which has an output connector O reference number ~~n r.~~ 51: L-N. Dotted broken line B illustrates an expanded idea of the transmitting ~~sending~~ apparatus according to this invention. Then the connecting ~~supply~~ cable is a fixed part of the apparatus and the output terminals ~~coupling~~ of the apparatus, expanded as per this idea, is the connecting ~~supply~~ cable ends l-n to be connected to the phase and the zero rail. The connecting ~~supply~~ cable length must be of the prior art as well as its electric and other properties.

The basic idea of this invention is that a connecting ~~supply~~ cable of certain length and type L_W, $\underline{Z}_W$ is a fixed part of the transmission apparatus and between cable ends l – n, coupled to the network phase rail and zero rail, the rail voltage $\underline{U}_{LOAD}$ is kept constant by means of feedback coupling. The output coupling L – N of the transmitting apparatus is at the same time a phase and zero rail connection. In this way the transmission signal $\underline{U}_{LOAD}/\underline{Z}_{LOAD}$ amplitude U_{LOAD}, which must be put in between phase and zero rail, is constant.

The internal generator impedance of the signal generator, formed by the transmitter and connecting cable, can in this way be formed almost to a rate of 0 ohm ~~measured in the voltage rail or wall outlet connection~~.

The invention is not in contradiction for instance with standard SFS-EN 50065-1, since the load ~~signal~~ voltage U_{LOAD} between the phase rail and zero rail ~~in voltage rail~~ or in the wall outlet does not under any ~~no~~ circumstances exceed the allowed rate 122 dBuV. The same result could be reached also without the invention if the length of connecting ~~supply~~ cable would be, for instance, only 10-20 cm. Generally, in practice it would, however, be impossible to use such a short length.

OPERATION ALTERNATIVE 1. BLOCKS 60 AND 70

a) Virtual Impedance Method

Steered before actual data transmission by micro processor $_{U}P$ included in ~~block~~ process unit 70, the signal amplifier 20 transmits ~~sends~~ a reference level signal of short ~~brief~~ duration, e.g., 40 ms, in such a way that the signal amplifier always receives its constant control voltage U_{RC} (RC = REFERENCE CONTROL) from the process unit ~~sample/holding/steering block~~ 70. The level of U_{RC} is such kind that from a load impedance Z_{LOAD} = 50 ohm, a transmission signal U_{LOAD} in size of e.g. 3,56 V_{PP} would be reached. U_{LC} is out of function.

During transmission, the load impedance (~~network~~ rail impedance) Z_{LOAD} is what it happens to be at that moment. Measuring and handling unit ~~Block~~ 60 measures the feedback ~~transmission~~ signal Ua from block 20, U_B from block 40 or U_C from block 50 and U_D from block 50. The feedback ~~transmission~~ signal voltages Ua, Ub or Uc are ~~is the~~ lower the lower that Z_{LOAD} is. ~~In block 50 of signal transformer Tc~~ The primary current I_C in coupling unit 50 of signal transformer T_C is measured by measuring the signal voltage U_d over series resistor R = 0,5 ohm ~~exceeding the series resistance~~. I_C is thus ~~the~~ higher the lower that the Z_{LOAD} is.

Alternatively, instead of the above I_C of the signal current, it is also possible to measure the secondary current I_{LOAD} of the signal transformer T_C, which current runs through coupling capacitor C_C to the connecting ~~supply~~ cable and further to load impedance Z_{LOAD}. The signal voltage U_D to be measured is proportional to signal current I_C or I_{LOAD}. If the I_{LOAD} is measured ~~by measuring U_D and/or U_C the coupling capacitor T_C is measured~~ from the secondary side before or after the coupling capacitor C_C, still a separate coupling unit is needed for coupling of signals Ud and Uc to measuring and handling unit ~~block~~ 60.

Alternatively signal voltage Ud can instead of coupling unit ~~block~~ 50 be measured from signal amplifier ~~block~~ 20 or signal filter 40. Signal voltage Ud gives information of signal current I_{LOAD} in the transmission situation.

The phase angle Ø between Ua, Ub, Uc and Ic depends on the phase angle of Z_{LOAD}, in other words ~~in~~ to what extent the Z_{LOAD} is resistive, capacitive or inductive. Measuring and handling unit ~~Block~~ 60 includes a phase difference detector and signal handling circuits ~~elements~~

and a lot of screening. On the basis of the above data in measuring and handling unit ~~block~~ 60, for instance, the following variables are calculated:

$$Z = Ua/Ic,\ Ub/Ic \text{ or } Uc/Ic \ \text{ ohm}$$

$$Z/\underline{\O} = \underline{Z}$$

$$\O = (\underline{U}a,\ \underline{I}c \text{ or } \underline{U}b,\ \underline{I}c \text{ or } \underline{U}c,\ \underline{I}c)$$

Impedance $\underline{Z}$ is a kind of a virtual impedance, which gives knowledge of the load impedance ~~on basis of which absolute value Z and on basis of phase angle Ø data of the~~ ~~$\underline{Z}_{LOAD}$ absolute value and phase angle is received~~.

In measuring and handling unit ~~block~~ 60, direct voltages U_Z and $U_\O$ proportional to measured virtual impedance modulus value Z and phase angle Ø are formed and taken to process unit ~~block~~ 70 ~~to~~ of the microprocessor that by means of U_{LC} memory map transforms them to ~~into~~ control voltage U_{LC} to control ~~steer~~ the amplification ~~or levels~~ of signal amplifier 20 so that load signal voltage U_{LOAD} is constant and the maximum allowable, ~~into such state that into load impedance Z_{LOAD} a transmission signal~~ e.g., 3,56 V_{PP} or 122 dBuV~~, constant to its level, is produced~~. U_{LC} remains in the holding circuit of process unit ~~block~~ 70 till after about 1-4 seconds, at which time it gets removed by a new U_{CL} value determined by the next new reference measuring (LC = LEVEL CONTROL).

All in all, always, for instance for 2 ms – 20 s, e.g., 40 ms, the apparatus sends a transmission signal according to certain reference level, for instance at intervals of 0,5 s - 30 s, e.g. 1 - 4 s. During the mentioned 40 ms, a virtual impedance $\underline{Z} = Z/\underline{\O}$ somehow proportional to the modulus value ~~size~~ and phase angle of load impedance $\underline{Z}_{LOAD}$ is determined, the variables U_Z and $U_\O$ determined by which there is picked from the U_{LC} memory map, Fig. 6, an U_{LC} control voltage to control the amplification of signal amplifier 20 so ~~corresponding to them in order to regulate them to such a state~~ that the load signal voltage U_{LOAD} is constant, ~~of the transmission signal level is~~ e.g., 3.56 V_{PP} with the load impedance in question.

b) Amplitude Method

Alternatively, for the above presented virtual impedance method ($Z\angle Ø$), the control voltage U_{LC} of signal amplifier 20 can be formed simply by means of transmission signals $\underline{U}a$, $\underline{U}b$ or $\underline{U}c$, and by means of $\underline{U}d$ amplitude monitoring.

The transmitting apparatus, reckoned from signal amplifier 20 and advancing through the low pass and/or band pass signal filter 40 and the coupling unit ~~network of block~~ 50 to the connecting ~~supply~~ cable and finally further to the load impedance $\underline{Z}_{LOAD}$, includes capacitors, resistors, chokes~~minithrottles~~, a transformer and other inductances and capacitors. Accordingly, by means of different load impedance $\underline{Z}_{LOAD}$ values, it is possible to measure from different locations in the apparatus transmission signals of different value ~~size~~ (Ua,Ub,Uc,Ud) as to their amplitude. For instance, on basis of amplitude combinations of two ~~transmission~~ signals, as Ub and Ud, the value ~~size~~ and nature of load impedance $\underline{Z}_{LOAD}$ can be concluded. It is the question of an amplitude method as an alternative to the virtual impedance method.

Figure 2: Block diagram of the whole invention and figure 6: U_{LC} memory map = U_{LC} (Z, Ø).

With control voltage U_{LC} it is possible in addition to block 20 or alternatively to control block 40, 50 and/or block 10. The same also concerns control voltage U_{RC}.

OPERATION ALTERNATIVE 2: BLOCKS (80 AND 90)

Feedback coupling is taken from the phase rail and zero rail. ~~(~~Rail signal voltage~~)~~ is load signal voltage U_{LOAD} / $\underline{Z}_{LOAD}$ ($l_{LOAD} - n_{LOAD}$) or ~~for example~~ from the wall outlet through coupling unit/feedback 80 to the ALC/ALG/ACC unit ~~block~~ 90, where control signal U_{ALC} or U_{AGC} or U_{ACC} is formed to control the output signal level U_{OUT} of signal amplifier 20 so that load signal voltage U_{LOAD}, i.e., rail signal voltage Ul-n ~~or the amplification formed to such a state that the level U_{LOAD} of the transmission signal~~ is constant, in other words independent of the load impedance $\underline{Z}_{LOAD}$.

ALC = Automatic Level Control

AGC = Automatic Gain Control

ACC = Automatic Cutting Control

Control voltage U_{ALC}, U_{AGC} and/or U_{ACC} can in addition to signal amplifier ~~block~~ 20 alternatively control block 40, 50 and/or block 10. The same is in question also with control voltage U_{RC}.

The ~~net work connecting unit, input unit~~ coupling unit 50 and the coupling unit/feedback ~~output unit~~ 80 include, in case of galvanic separation, a coupling transformer T_C and T_{CC} and a coupling capacitor C_C and C_{CC} and possibly also other components. Alternatively there is ~~in~~ a so called direct coupling no galvanic separation from the network, and the coupling units 50 and 80 can in their simplicity include only a coupling capacitor C_C and C_{CC}.

THE FIRST ~~A PRACTICAL~~ APPLICATION OF THE INVENTION. FIGURE 3

Figure 3 shows first ~~a practical~~ application of the invention. The operating principle is already described above. In connection with U_{LC} memory map, figure 6, it can be stated that it presents the control voltage values U_{LC} of the signal amplifier 20 corresponding to 304 different load impedance $\underline{Z}_{LOAD}$ values, by means of which it is then possible to bring about to the load impedance in question a constant load signal ~~transmission~~ voltage U_{LOAD} 3,56 V_{PP} or 122 dBuV.

In addition to the $\underline{Z}_{LOAD}$ of impedances, it presents the $\underline{Z} = Z\angle Ø$ values Z and Ø of the measured virtual impedance, as addresses of the storage location, and the U_{LC} value as content of said storage location. The virtual impedance $\underline{Z}$ is, in addition to coupling unit ~~block~~ 50, also affected by blocks 20 and 40 preceding it and by the connecting ~~supply~~ cable. Accordingly, the virtual impedance does not give any good linear picture of load impedance $\underline{Z}_{LOAD}$, especially in so far as the phase angle Ø is concerned. This is due to the fact that from signal amplifier 20 to load impedance $\underline{Z}_{LOAD}$ there are chokes ~~throttles~~, a transformer, capacitors and a connecting ~~supply~~ cable, by the interaction of which there are phase distortions as well as ~~by~~ different resonance effects. One brilliant idea of the invention is that its above mentioned circumstances are of no importance at all, since it is enough that the virtual impedance in some way depends only on the $\underline{Z}_{LOAD}$ and the connecting ~~supply~~ cable, and only in some way differing virtual impedance values Z and Ø are produced and by this means U_{LC} memory map addresses Z and Ø. Then into an appropriate storage location such a control voltage value U_{LC} of the signal

amplifier is stored, so that by means of it a proper output signal voltage U_{OUT} of the signal amplifier and a constant load ~~transmission~~ signal voltage, ~~(~~rail signal~~)~~ voltage U_{LOAD} to the appropriate load impedance $\underline{Z}_{LOAD}$ is produced.

The invention functions by dotlike frequencies or by a certain frequency band. An U_{LC} memory map is always needed for frequencies or frequency bands far enough from one another and for different connecting ~~supply~~ cables. If the virtual impedance is not exactly the same as some storage location address, the closest or a more proper address is chosen.

In the U_{LC} memory map there can be more or even less than 304 storage locations. In practice, a whole swarm of memory maps may be needed. If a sufficient amount of connecting ~~supply~~ cables of different length and type are used and with frequencies or frequency bands far enough from one another for each case, a~~n~~ ~~own~~ unique U_{LC} memory map is needed. Instead of the 3 m length, the connecting ~~supply~~ cable can be even longer, but then ~~the~~ it may be necessary to increase the supply ~~operating~~ voltage Us of signal amplifier 20.

The value tolerances of the transmitter components must be small enough precision components or then by each entire transmitter unit an U_{LC} memory map is programmed in a special programming location individually by serial production. This applies to this and the next practical application.

THE SECOND ~~ANOTHER PRACTICAL~~ APPLICATION OF THE INVENTION. FIGURE 4

Instead of the virtual impedance method, the amplitude method can be used in order to generate a control voltage U_{CL}. In the amplitude method, it is possible to determine, on basis of two, for instance Ub and Ud signal voltage amplitudes, from the U_{LC} memory map $U_{LC}= U_{LC}$ (Ub and Ud), a control voltage U_{LC} corresponding to load impedance $\underline{Z}_{LOAD}$ ~~can be determined,~~ which regulates the output signal amplitude ~~amplifier outlet voltage~~ U_{OUT} in signal amplifier 20 so that load signal voltage U_{LOAD} ~~as to its amplitude to such state that rail signal U_{LOAD}/Z_{LOAD}~~ is constant ~~as to its level~~, in other words e.g., 3,5 V_{pp} or 122 dBu V. Quite clear differences have been measured for Ub and Ud, when $Z_{LOAD} = 1 - 50$ ohm and $Ø_{LOAD} = 0- \pm 90°$: Ubmax-Ubmin

= 6 V_{pp} and Udmax -Udmin = 310 mV_{pp}/0,5 ohm. The Ub and Ud amplitude can be measured by an A/D transformer, ~~(~~10 and 8 bits~~)~~, during transmitting of the reference signal, i.e., output signal voltage U_{OUT} in signal amplifier 20 is constant, ~~transmission of an ohm signal 3,56 V_{pp} of reference level,~~ for instance 40 ms /1 - 4 seconds.

The bit figure 10 + 8 received from A/D transformer, corresponding to Ub and Ud, can function directly as an address of the memory map.~~,~~ From the storage location indicated by it, a control voltage U_{LC}, proper for the situation, is reached for signal amplifier 20 by means of the sample and hold ~~holding~~ circuit in process unit ~~block~~ 70. From U_{LC} memory map, the closest or more proper address is chosen if the measured address is not exactly the same. Instead of the A/D transformer, comparator circuits ~~degrees~~ can be used to measure the Ub and Ud levels of transmitted ~~transmission~~ signals by steps.

The U_{LC} memory map presented in figure 6 is suited also for this ~~practical~~ application of the invention and if the address co-ordinates Z and Ø of the storage locations are correspondingly transformed into Ub and Ud.~~,~~ $U_{LC} = U_{LC}$ (Ub, Ud).

The ~~A~~ third ~~practical~~ application of the invention. Figure 5.

Figure 7 shows ~~of this practical application transmission signal level~~ load signal voltage U_{LOAD} (1) with feedback coupling with blocks 80 and 90 and (2) and without feedback coupling U_{LOAD} ~~(2)~~ as a function of load impedance i.e., ~~(~~rail impedance~~)~~ Z_{LOAD} during transmitting. ~~Figure 7 shows the signal levels of figure 5 practical application.~~ The output ~~transmission~~ signal of the real apparatus is $U_W + U_{LOAD}$ in net connector 51, L – N ~~(51)~~ with feedback coupling.

Previously known is that the longer the connecting ~~supply~~ cable L_W, Z_W of the transmitter of a data transmission system in a low voltage ~~tension~~ net, and the lower the impedance by signal frequencies in the other end of connecting ~~supply~~ cable ~~other end (~~as load impedance, ~~or~~ rail impedance~~)~~ or net impedance Z_{LOAD}, the lower the load signal voltage ~~level~~ U_{LOAD} ~~of the transmission signal~~over Z_{LOAD} during transmitting.

However, previously no effective means ~~are~~ were known on how to eliminate the strong weakening of signal caused by the above mentioned circumstances. The problem does not vanish in that the transmitter maintains to keep the signal level constant in its output connector.

OPERATION ALTERNATIVE 1: FIGS 3 AND 4

In the transmitting ~~transmission~~ situation when output signal voltage U_{OUT} in signal amplifier 20 is constant, the reference signal ~~(U_{OUT} block 20) of certain level reference~~ is sent repeatedly but of short duration ~~briefly~~ and during that time one or more transmission signals Ua,b,c...Un are measured from different locations of the ~~transmitting~~ apparatus i.e., ~~(~~apparatus + connecting ~~supply~~ cable~~)~~. Then ~~by means of which~~ signal amplitudes, phase shifts (keying), proportions, multiplies, sums and other features are handled and calculated and the control signal U_{LC} from processor unit 70 controls blocks 20, 40, 10 and 50 so that load signal voltage U_{LOAD} is constant, in other words independent of load impedance Z_{LOAD} till the transmitting of the next reference signal~~of the output signal is regulated the blocks 20, 40, 10 and/or 50 in the transmitter directly or by means of control signals block 60 and 70 to such a state~~ that load signal voltage U_{LOAD} ~~the amplitude U_{LOAD} of the rail signal U_{LOAD}~~ is constant, in other words independent of load impedance Z_{LOAD} till the transmitting ~~transmission~~ of the next reference ~~level~~ signal. Signals Ua-Un, U_Z, $U_Ø$, U_{RC}, U_{LC}, U_{ALC}, U_{ACC} and U_{AGC} can instead of the voltage signal be current signals, frequency signals, code signals, electric field signals, magnet field signals, optical signals, electromagnetic signals and/or signals of other possible types.

OPERATION ALTERNATIVE 2:

In the transmitting ~~transmission~~ situation, the feedback signal U_{LOAD} i.e., $U_{l\text{-}n}$ is taken directly from the rail impedance Z_{LOAD} ~~poles or near the poles~~ connecting points l-n or near the connecting points, ~~(~~usually from the phase and zero rails~~)~~. The feedback signal is brought to coupling unit/feedback ~~output signal~~ 80 by separate conductors and further to ALC/AGC/ACC unit ~~block~~ 90, where control voltage U_{ALC}, U_{AGC} and/or U_{ACC} to be produced, is taken to control the output or voltage signal of blocks 20, 40, 10 and/or 50 to such state that the ~~amplitude U_{LOAD} of rail signal~~ load signal voltage U_{LOAD} , as rail signal voltage is constant or almost constant.